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DISEASES OF THE NERVOUS SYSTEM

A PRACTICAL JOURNAL ON PSYCHIATRY AND NEUROLOGY

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DISEASES of the NERVOUS SYSTEM

(PUBLISHED MONTHLY)

A PRACTICAL JOURNAL ON PSYCHIATRY AND NEUROLOGY

The Neuropsychiatric Problem In Returning Servicemen*

LT. COMDR. HOWARD P. ROME
(MC), USNR

The neuropsychiatric problem in the returning serviceman is only one aspect of a very large veterans' problem which confronts the nation at present and which will constitute an even larger problem in the future. It is essential to recognize that circumstances outside of health and the desire to work are material influences in the solution of the veterans' problem. This is particularly true of the veteran discharged because of a neuropsychiatric disability. These problems are not new to us for we as a nation have always had our veterans. In the past we have had psychiatric problems which, however, were not always accepted realistically. This war is unique in that we are attempting to formulate our tasks sufficiently in advance so that they can be solved by techniques of election rather than by the pressures of necessity. The veterans' problem is one which would not be solved if left for solution to circumstance and convenience. All governmental, state and municipal agencies concerned with the reintegration of these men have accepted this fact and are vigorously approaching the problem.

Unfortunately my remarks must be confined to generalities since, for reasons of security I am not permitted to cite statistical data on which current and future plans are based. However, the following is a description of the setting of the neuropsychiatric problem in the Naval Service ashore and afloat outside of the continental United States. The size of the forces involved, the setting and circumstances in which most of the naval warfare has been conducted, the vast distances involved, the tropical climate and almost unbelievably taxing conditions in which island warfare is conducted, the mobility of the forces involved all compel us to give more weight to the importance of environmental stress in producing a psychiatric casualty than is the case in ordinary civilian psychiatric casualties. Then, too, it must be remembered that the judgments and criteria used in the evaluation of a man in military service are perforce based on his capacity to adjust to and cope with the peculiar demands of military life.

Military standards of performance are high for even ordinary military stresses are infrequently met with in civilian life. The net result is that the military situation contains greatly increased psychological pressure, consequently the judgment of adequacy in a military sense must be different from the concept of adequacy in a civilian sense. By the same token, failure to meet military standards of adequacy is not, of itself, a prediction of future maladaption in civilian life. Psychiatric judgments in the Naval Service are inescapably influenced by a realistic military necessity, by strict medico-legal, social and ethical requirements. Judgments are made upon an evaluation of the individual's effective performance, often in situations which have no civilian equiva-

* Presented at the Montgomery County Medical Society, Montgomery County, Maryland, January 30th, 1945.

lent. It is obvious therefore, that with a finer mesh more persons will be screened out.

When complete statistics are available it will be found that of the total number of men discharged for neuropsychiatric reasons, there is a significant percentage who have had relatively little actual military life, have never been out of the United States and have never experienced combat. Too frequently the erroneous impression is gained that the bulk of the service's psychiatric casualties have been incapacitated because of severe and harrowing combat experience. Actually the operation of the screening procedure in the Naval Service precludes this. Of course a recruit discharged from a naval training station is a returning serviceman but his condition cannot be attributed to combat experience.

It was realized before the war that there can be no test situation, no battery of psychological examinations and no psychiatric examinations which will efficiently and consistently predict the likelihood of breakdown in any given case with sufficient accuracy to be of absolute prophylactic value. The only reliable criteria for predicting these occurrences are time and observation in the actual situation of stress. As a whole the selective procedures which have been devised, predict with good accuracy the future adjustments of the entire group taking into account that the cost in terms of false positives and false negatives is worthwhile.

The present naval procedure requires the re-examination of recruits upon their reporting to naval training stations. If, after prolonged observation during the approximately seven-weeks training period with the benefit of detailed social service history and repeated examinations, it is felt that he does not meet the established standards, the recruit may then be discharged. Obviously, this short period of service has not radically altered the man's capacity for civilian adjustment. And yet he has to be reinstated in his community, re-establish himself socially and economically and pick up where he left off a short time before. However, the prophylactic value to the Service and the man by these additional precautionary measures is well worth the time, money and effort expended in his behalf.

Civilian psychiatric practice accepts the patient's symptoms as relatively fixed things, significant in themselves since they bring the patient to the doctor. In military psychiatry, in addition to the symptom picture, it is necessary to consider the situation in which they occur, their effect upon others and upon the whole military operation, and then to relate the findings to the effectiveness of the individual and make a final decision with the welfare of the group as the primary consideration and the welfare of the individual as a secondary consideration. We cannot lose sight of the fact that a war had to be fought and won and that our job was dedicated to this end above all others. It is noteworthy that in no other situation are the psychoneurotic, the psychopath and the non-effective so labeled and eliminated. These attitudes cannot help being reflected in the men who are separated from the Service with psychiatric labels. It should be remembered that these men were non-effective only from a military standpoint and this should not be construed to indicate their need for further treatment or their inability to be productive citizens, nor is it an index of the liability they might be in their home community.

I emphasize these factors and stress these points because, unless they are fully appreciated, one is likely to magnify the already huge task which confronts the nation in reintegrating the returning sericeman. However, I do not intend to minimize the significance of a military psychiatric diagnosis.

The findings of the Selective Service System nation-wide audit of the health of our young male population has forcibly brought to public notice the state of the physical and psychological adequacy of the nation's manpower. One hears that the Armed Services add to this total a quotient of manpower said to be in need of this, that or other remedial treatment. When all of these background factors are placed in their proper relation, the prospects of ultimate success in handling the veterans' situation are good.

Broadly speaking, rehabilitation and re-

integration programs have two phases. The first or military phase is carried on within the framework of the military organization before the man is separated from the Service. The second or civilian phase is begun upon the return of the veteran to his civilian community. Both of these phases are of equal importance and the success of each is interdependent. The Navy, aware of the importance and magnitude of this task, has formulated and is carrying out a large-scale program directed toward the satisfactory conclusion of its parts of the military phase. This approach has been expanded to the degree that the basic idea of treatment and reconditioning is operative from the time the individual becomes a casualty until he is either ready to return to duty or fit to be discharged from the Service.

In psychiatry, as in all branches of medicine, the most important form of treatment is prevention. Therefore, the work of the psychiatrist in rehabilitation begins with the recruit's first contact with the Service in the neuropsychiatric screening of inductees. This elimination of potential psychiatric casualties at induction and training centers removes men whose retention would not only be deleterious to the Navy but also unnecessarily stressful to the man. By means of this type of selection, the burden of future rehabilitation is lightened considerably. Naval psychiatrists are constantly mindful of the need for early treatment. Prompt intervention and relatively minimal therapy are able to accomplish a great deal more early in the course of a break than considerable and lengthy treatment is able to do at a later time. Each theatre of operation has a vast network of base, mobile and fleet hospitals with trained psychiatrists on each staff. There are psychiatrists attached to all ambulance and hospital ships which transport the sick and wounded.

If it appears that the patient will require lengthy treatment or his disability is such that the likelihood of return to duty seems remote, he is returned to the United States at the earliest opportunity. Here again these patients are observed and treated in the psychiatric divisions of general or convalescent hospitals. Psychotic patients are transferred for definitive treatment to the Navy Units in St. Elizabeth's Hospital, Washington, D. C., or to the U. S. Public Health Service Hospital, Ft. Worth, Texas. There is a gratifying high rate of recovery of the psychoses; this coupled with a very low incidence makes the problem of frank mental disease relatively insignificant.

For the treatment of other types of psychiatric patients, the Medical Department has had in operation a widespread use of group psychiatric therapy. Although it was begun as an expedient, it has been found to have a definite place in any comprehensive treatment program. It is an educational procedure which stresses regulated, graduated participation of groups of patients. The patient lives in a therapeutic environment, the purpose being to reproduce on a small scale the kind of living which characterizes normal military life. Each soldier and sailor belongs to groups or units to which he soon develops close feelings of allegiance and affiliation. These group ties support him in periods of stress and in essence constitute the framework of morale which is so esential in any organization. Numerous benefits accrue to psychiatric patients from this type of treatment. First and foremost, group treatment breaks down the barriers of isolation which to a greater or lesser degree typify the social attitude of all psychiatric patients. The patient soon recognizes the fact that he and his symptoms are not unique. He learns that adjustment means the capacity to give and take in such a manner that he and his associates all profit. In addition to group discussions in which he has the opportunity to present his personal problems and have the benefit of others in the same boat talk about theirs, the patient has a planned schedule which he follows with his group. This is closely analogous to everyday naval life, the only difference being that it is done in a hospital setting. The same principles of competition and stress which he has to meet in naval life operate in this program except that they are scaled down to meet the needs and capacities of the patient.

An attempt is made also to have every psychiatric patient whose problem is related

to his combat experience have the benefit of treatment before he is returned to duty or discharged from the Naval Service. In this way, the Bureau of Medicine and Surgery seeks to complete its phase of the over-all rehabilitation. There is reason to believe that 80 percent of these persons are well enough upon discharge to get a job and hold it with no greater incidence of intercurrent illness or disability interfering with their productiveness than prior to their entry in the service. I think it is generally accepted that psychiatric patients as a group are vulnerable to periods of unemployment. Their basic difficulties of adjustment are prone to be reflected in unemployment in periods of economic stress. Therefore, the problem of the psychiatrically discharged serviceman is essentially the problem of the psychiatrically ill segment of the population.

The first and greatest adjustment the rereturning veteran is called upon to make is the change from military to a civilian attitude. Upon entering the Service, each man was helped in making an adjustment. There were indoctrination courses and training periods designed to facilitate his adjustment. There is unanimous agreement within the Armed Forces and other governmental agencies concerned that a reversal of this procedure must be planned and put into effect. Every hospital and each discharge center is organized to acquaint the dischargee with the problems which will confront him as a civilian. Trained personnel familiar with the veterans rights, benefits and privileges spend time with these men to advise them on what to do and how to do it. Opportunities for further training under the G. I. Bill of Rights are explained to the man, help is provided in assisting him to make an intelligent choice of a new job or to aid him in getting back his old one. Careful physical, psychological and psychiatric examinations make sure that he is fit for discharge. Every safeguard is provided for a reasonably speedy adjustment and the rest is properly the job of the nation at large. In this regard much work is being done to familiarize the public with their responsibilities.[1]

These are some of the things which have been done and are being done to aid the returning veteran. When one has the opportunity to see the vast amount of constructive effort being devoted to this phase of our public welfare, one is reassured in the belief that this task is being tackled aggressively and competently.

There are Separation Centers at which representatives of the Veterans Administration, U. S. Employment Service, Civil Service, and Selective Service are stationed. Each of the men is given a document which describes in detail the highest rating he held in the service and indicates the civilian jobs for which he is wholly or partly qualified. There are 451 totally different kinds of civilian occupations according to the 1940 census so that the need of vocational training and education for the veteran population is apparent. Significantly, a high percentage of service personnel has indicated a desire for these benefits. According to one estimate, 4,410,000 men are potential applicants for educational benefits.

Present laws grant a 90-day period of grace for re-employment in an old job. Seniority in the Government Service is assured. There are 30,207 apprentice training programs in the United States and veterans are qualified for entrance in these and are eligible for benefits during the learning period. Unemployment insurance, guaranteed loans, disability benefits, and legal protection are some of the other governmental provisions which will safeguard and insure the returning veteran.

The reintegration of returning veterans is but one of the many problems the nation is faced with. They must all be worked into the same pattern if they are to be solved practically. We have learned as one of the major lessons of the war that no one man nor any group of men can be considered apart from the main body of men. Certainly the same attitude of approaching the problem of the returning serviceman as a whole will be productive of best results.

REFERENCE

1. "When He Comes Back If He Comes Back Nervous," by T. A. C. Rennie & L. E. Woodward, The National Committee for Mental Hygiene, Inc., N. Y.

AUTHOR'S NOTE: The opinions contained herein are the private ones of the author and do not necessarily reflect the policy or opinions of the Navy Department.

Correlation Between Electroencephalograms and Deep Reflexes in Normal Adults*

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Introduction

Since the original observations of Berger it has been demonstrated by many investigators that the electroencephalograms (EEGs) of normal adults have definite wave-forms. In fact, interpretations of the EEG today are based on knowledge of the normal characteristics of rate, amplitude and pattern of such wave-forms.[1, 5, 9] Furthermore, the EEGs of normal subjects can now be grouped according to various characteristics such as rate, or percent of 8-12/sec. alpha activity, or of fast, 16-30/sec. beta activity. Harty, Gibbs and Gibbs[11] found, in 275 candidates for military service with normal EEGs, that 15% had an alpha-rate of 10/sec. and that, on either side of this peak, the rates could be fitted into a curve from 1% at 8.5/sec. to 3% at 12/sec.

The percent of alpha activity or alpha index, in normal individuals also falls within predictable limits[5, 12] ranging from 0 to 100%, and fast activity at a rate of 16-30/sec. may be present in varying amounts which are generally, but not always, inversely proportional to the percent of alpha activity.[7]

Thus far investigations have not shown reason why—once the subject is relaxed and complying with experimental conditions—the record of one normal adult should have individual characteristics differing from that of another. In the present report it will be demonstrated that the character of the EEG, i.e. percent and rate of alpha and fast activity has some correlation with the status of the deep tendon reflexes. This correlation will be then discussed as it concerns both physiological concepts and the practical interpretation of EEGs.

In a series of 56 normal subjects with normal EEGs it has been found that those individuals with reflexes which are difficult to elicit (designated clinically as plus-minus or 1 plus) have EEGs with a high percentage of alpha activity and little or no fast activity, whereas those who have hyperactive (4 plus) deep reflexes have little alpha and a high percentage of fast activity.

The observations which led to the initiation of this investigation are reported elsewhere.[16] It was found that patients during the acute stages of delirium tremens, had characteristic EEGs of low amplitude in which there was little alpha activity. Later, after full recovery and the disappearance of the tremor and hyperactive reflexes which had been the only neurologically abnormal signs, a second EEG, taken on the same patient, tended to have a higher percent of alpha activity.

It was thought at first, that anxiety, fear and tension, which are always extreme during an attack of delirium tremens, might be the factors which could be correlated with the EEG characteristics. Since the presence of alpha activity is known to depend not only on the absence of visual stimuli but also on relaxation of the individual it was conceivable that emotional tension alone obliterated alpha activity. Therefore records of a number of patients with acute tension or anxiety states which were not delirium tremens were made. But this group of individuals did not consistently show a characteristic EEG type as did the group of patients with delirium tremens. It was then noted that those of the patients with anxiety states who had also tremor and increased deep reflexes and a general tendency to startle easily had EEGs with low alpha indices and a high percentage of fast activity, comparable to those of patients with delirium tremens. This led to the present investigation of similar relationships in normal subjects.

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Procedure

1. Subjects: The subjects were 56 volunteers from staff and students of the Medical School. There were 50 males and 6 females. Forty four of these were medical students the remaining 12 ranged in age from 27 to 45 with one exception, aged 60. Two additional normal subjects from whom records were obtained produced EEGs which were slightly abnormal. These two records were discarded from the series. No subject had at any time had any neurologically abnormal condition. Many of the students had had blows on the head, several had been knocked unconscious and one had sustained a fractured skull. There was no correlation between head injury and type of normal EEG. No other pertinent factors were obtained from the rather brief histories taken. An attempt was made to correlate the EEG data with the ability of the subject to relax, his anxiety or tension, and his sleep habits. No significant data were produced here, probably because the method of obtaining these data, solely by questioning the subject, was too inaccurate and inadequate.

The factors of age and sex have been discounted in this study. First, because it did not seem likely that age would affect the findings within the age group of 18 to 45 years into which all but one subject fell.[8] Second, because indications are that sex should have no effect on pertinent data except as regards rate of alpha activity which is said to be somewhat higher in females than in males. It is possible that further study with a larger group may necessitate some qualifications with respect to these two factors.

2. Deep Reflexes: Since it was postulated that there might be a difference between the EEGs of individuals with hyperactive and those with hypoactive reflexes, volunteers were asked for, at first, who had reflexes at the extremes of the range, i.e. either "4 plus" or "plus-minus." Eventually others with moderate reflex activity were added. But in the entire group of 56, 10 had reflexes of 4 plus rating, 6 had one plus and 7 plus-minus reactivity; 33 lay between in the 2 and 3 plus range.

Tendon jerks were measured and recorded according to usual clinical procedure, using a reflex hammer. The subjects sat, relaxed, in the chair in which the electrodes were applied. Five grades or degrees of tendon reflexes were recorded: plus-minus (if reinforcement was necessary for the knee jerks), one, two, three and four plus. Usually the knee jerks had been previously examined during the process of selecting the volunteer. Often, but not always deep reflexes were checked at the end of the EEG procedure as well as at the beginning. The procedure was admittedly crude, but was felt by both examiners to be as valid as the usual clinical method of evaluating reflexes. The knee jerk appeared to be the deep reflex which was most easily altered by immediate conscious or semiconscious processes. Deep reflexes of the arm, biceps, triceps and radial, as well as those of the leg were therefore evaluated in the estimate of reflex status.

3. EEG Records: The EEGs were recorded by a Grass, 6-channel, ink-writing oscillograph. Six leads were applied to the head—on the left and right frontal, central and occipital areas. The usual monopolar, bipolar and trans-hemisphere recordings were made. Subjects lay relaxed on a couch in semidarkness and quiet. Hyperventilation was not carried out.

4. Interpretation of EEGs: After a preliminary inspection to exclude abnormal records and to note the general character of each record, the alpha percent was determined. This was measured on two strips of 100 cm. each, which were chosen as having the best alpha activity, one from the monopolar, occipital record and one from bipolar, occipito-central record. Two counts of each of the two strips were made at different times with consistently close results in the readings of the same strip. The percent alpha was considered the highest percent of these four readings. Alpha activity was defined as 8-12/sec. activity present in intervals of two or more consecutive wave-forms. In the same way the percent alpha activity was measured on the frontal records of 20 subjects, ten selected as having the highest percent occipital alpha activity and ten with lowest.

Amplitude was also measured from the right monopolar and the trans-hemisphere records in frontal, central and occipital tracings. The difference in amplitude between frontal and occipital records was computed. Rate of alpha activity was counted on each record and ratio of percent alpha to rate alpha was computed. Amount of fast activity was appraised from the records of all three cortical regions and in monopolar and trans-hemisphere records. It was recorded as from one to three plus by inspection only.

Observations

The results of this comparison of reflex status and EEG activity can best be demonstrated by the charts (Figs. 1-4).

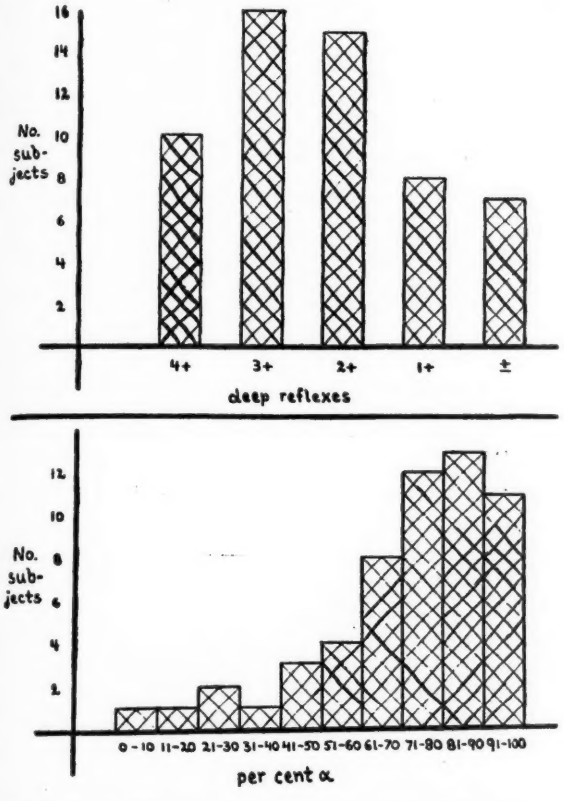

Fig. 1. Distribution of deep reflexes and percent alpha activity in a group of 56 normal subjects.

In Fig. 1 is shown the number of subjects with various degrees of reflex activity and the curve of distribution of percent alpha activity in the EEGs of the same subjects. The curve of distribution of reflex status indicates what has been mentioned above, that, because of deliberate selection of subjects, there are more subjects with extreme hypo- or hyperactive reflexes than would be expected from ordinary clinical experience where a plus-minus or 4-plus reflex is rare.

The percents of alpha activity of our group, when compared to those of normal groups recorded by other investigators,[4, 5] average higher. We have no explanation for this although there are several possibilities. Age and type of subject is probably not the cause since the subjects of Davis and Davis[5] where also students and staff of a medical school. The factor of cooperation and relaxation of the subjects may play a part although it could not wholly account for the difference even if some reason be devised as to why these subjects shoul dbe especially relaxed. More probably the method used in counting alpha activity is the cause. But, since all counts made in the same way, as described above, this has no bearing on the final interpretations. The distribution of rates of alpha activity is more like that reported by other investigators.[9, 11]

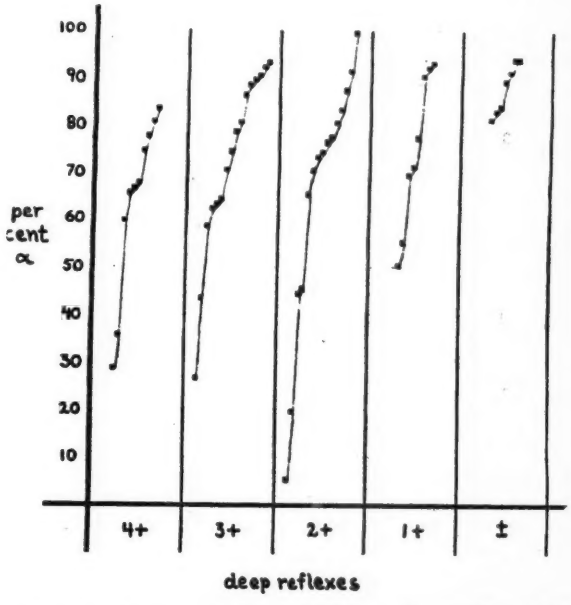

Fig. 2. Percent alpha activity in the EEGs of 56 normal subjects correlated with reflex excitability.

In Fig. 2 may be seen the relations between deep reflexes and the percent alpha activity. Although there is wide spread of percent alpha in each of the groups having different reflex activities, the average alpha activity of the 7 subjects with plus-minus reflexes is 89% and the averages for 1 to 4 plus reflexes are 75%, 67%, 73% and 64%

in that order. The differences in alpha activity between the plus-minus or 1 plus and the 4 plus reflex groups are significant. The data on intervening 2 and 3 plus reflex groups are less so because of difficulty in appraising fine grades of reflex activity and because some fluctuation in reflex status of an individual is to be expected. Thus, it is as easy to differentiate between the reflexes of an individual whose knee jerk cannot be elicited without reinforcement and one with 4 plus activity as it is to tell an EEG record with predominant alpha activity from one with little such activity. The intermediate differentiation in both reflex estimates and EEG appraisal is less clear cut.

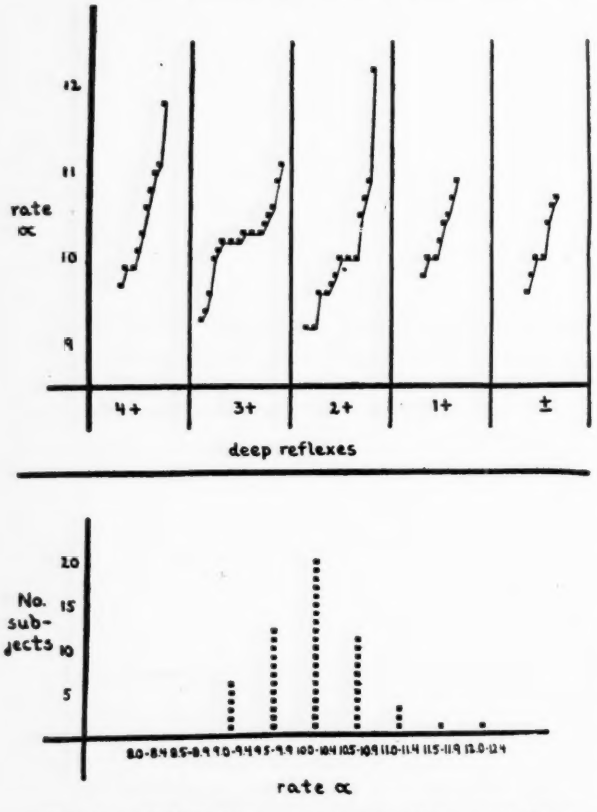

Fig. 3. Distribution of rate of alpha activity in the EEGs arranged according to deep reflex excitability (upper), and distribution of rate of alpha activity according to number of subjects (lower).

In Fig. 3 may be seen the curve of distribution of the rate of alpha activity in the group and the relation of rate to reflex status. There is some correlation between these last two factors. This is to be expected as slow rates are more often found in records with a high percent of alpha activity and vice versa. Fig. 4, in which the ratio of percent alpha to rate alpha has been plotted in different reflex groups, shows marked differences in EEG type as related to reflex status. Since Figs. 2 and 3 show that reactivity of deep reflexes is inversely proportional to percent and directly proportional to rate of alpha activity, the ratio of percent alpha to rate alpha can be expected to give the best correlation.

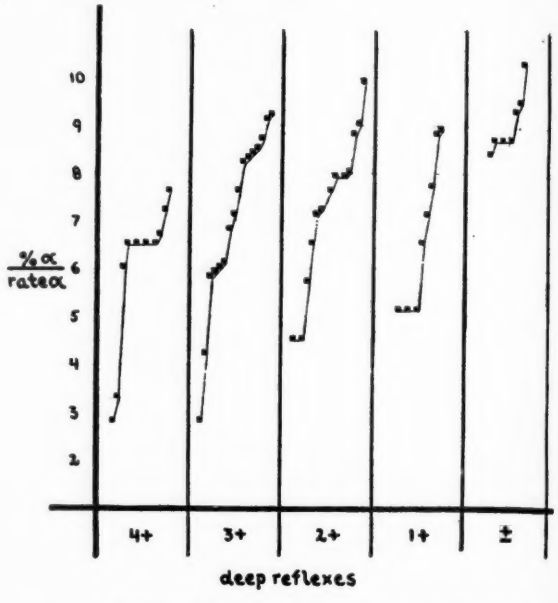

Fig. 4. Ratio of percent of alpha activity to rate alpha activity correlated with deep reflex activity.

Although it was eventually decided that the percent and rate of alpha activity were all that was necessary for differentiation of EEGS in this study, measurement of amplitude and of fast, beta activity were carried out as described above. Nothing of interest developed from the amplitude measurements beyond the fact, already well known, that amplitude was always higher in occipital than in frontal leads, and greatest in records showing pronounced alpha activity.

It developed that, although fast activity might be the striking characteristic of a record of an individual with hyperactive reflexes, this fast activity was often difficult to count unless records were made at fast speed whereas 8-12/sec. activity, usually present when fast activity was absent—could be easily measured at the usual rate of 10 secs. per each 30 cm. of record. Fast activity in frontal poles was furthermore often very low in amplitude which made

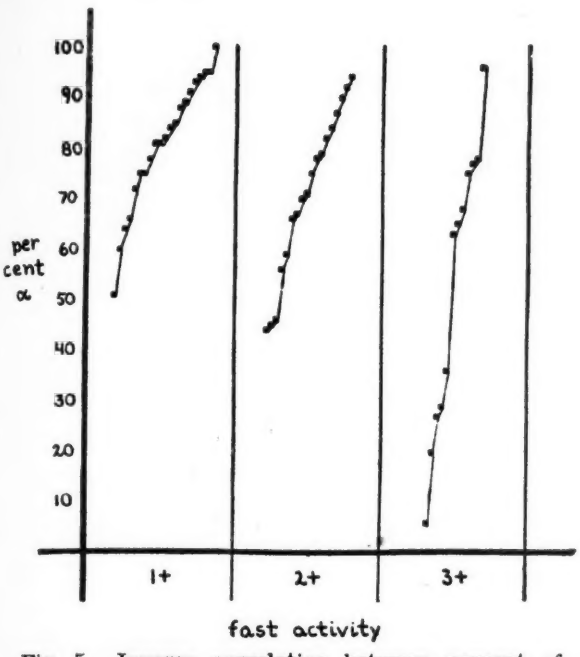

Fig. 5. Inverse correlation between percent of alpha activity and of fast activity in the EEGs of 56 normal subjects.

measurement difficult. In Fig. 5 the correlation between percent alpha activity and amount of fast activity is shown.

Discussion

On first consideration any direct interdependence between status of deep reflexes and pattern of EEGs seems remote. There is, however, in addition to the data here presented, much contributory evidence which indicates that such is the case.

The deep reflexes of an individual are known to have a basic status during relaxation. This remains much the same throughout life as far as is known, although many factors may affect it such as exercise, fatigue or bladder dilatation.[6] Jacobson has shown that training or conditioning processes which augment relaxation may directly reduce the knee jerk.[14,15] The knee jerk can be increased in man by large doses of benzedrine or ephedrine and can be augmented in spinal monkeys by the same drug.[13] Muscular tension such as that used in "reinforcing" the knee jerk, causes increase of deep reflexes and excitement or stress have the same effect for the same reason. Muscular tension is increased by fear or anxiety.

In pathological conditions reflexes may be increased either by focal changes affecting descending corticospinal connections, by generalized organic changes such as those of delirium tremens or by such "psychogenic" states as battle fatigue or some of the agitated depressions.

The EEG has been shown to be affected by all of the above factors except the purely local. Adrenalin or benzedrine cause a shift of rate of EEG with increased fast activity.[3, 10] Alpha activity is reduced or obliterated temporarily by failure of the subject to relax. High degrees of fast activity are found most often in excited patients—either manics or those with agitated depressions.[2, 5, 7]

Strauss,[17] discussing the EEGs of neurotic patients, cites tension as a factor directly altering the EEG pattern. In our opinion there must be two types of such tension, one, related to the immediate ability of the individual to relax during the time of EEG recording. This type of tension is responsible for the occasional appearance of better wave-forms and a higher alpha index at the end of a record than at the beginning, solely because of the patient's greater cooperation and loss of apprehension during the procedure. The second type of tension is less variable and more deep seated. It is a factor which, instead of altering EEG type in a given subject, tends to maintain similar EEG characteristics on repeated examination over a period of many days or even years. It is no more and no less changeable than the deep reflexes.

In a given normal individual then, it can be postulated that there is a basic level of reflex activity which is lowest when he is completely resting and relaxed and that there is similarly a basic pattern of EEG which contains wave-forms characteristic in rate and amplitude for that individual. Those who, during relaxation, have high thresholds for reflex response to a stretch stimulus applied to tendon or muscle fibers have EEGs of high voltage, relatively slow rate and high degree of alpha activity, when compared with the EEGs of individuals with low reflex thresholds. Many factors playing upon these basic levels may normally alter both reflex threshold and EEG pattern but some of the type characteristics will re-

main as long as the nervous system of the individual is still normal.

Since either emotional factors or sympathomimetic drugs acting on autonomic and somatic nervous pathways create "tensions" which, in the simpler stretch reflex mechanisms, lower thresholds by facilitation, it is possible that at the higher levels of the nervous system, facilitation also occurs. If this is so the "resting" state of cortical neurons is then altered and this becomes manifest by a change in EEG pattern. It is easy, then, to assume that, in pathological conditions generalized lowering of threshold for reflex activity and coincident EEG changes may be produced by prolonged and exaggerated stimuli of the same sort.

CONCLUSIONS

1. The character of the normal EEG can be correlated with the deep reflex status of the individual.

2. Subjects with deep reflexes of high threshold which are hence, difficult to elicit, have EEGs which are of relatively high amplitude, high percent alpha activity and slow alpha rate. Those with easily elicited and active deep reflexes have EEGs with relatively little alpha activity, fast alpha rate and low amplitude.

3. Fast activity is present to greater degree in the EEGs of normal individuals with high reflex activity and low percent of alpha activity.

4. It is suggested that muscular tension, anxiety or sympathomimetic drugs, which are known to increase reflex activity of the simpler type, may act similarly upon the more complex neuronal mechanisms and that in this way the "resting" cortical potentials are affected.

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Narco-Analysis in Private Practice

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The use of hypnotic agents in psychotherapy and analysis is not new to the field of psychiatry but the scope and extent to which they are now being employed in private practice is relatively recent. The term narco-analysis was originated by Horsley in 1935. The method consists in administration of a solution of barbiturate intravenously to produce narcosis and in utilizing the patient's subsequent remarks as a basis for analysis and synthesis. It is not the purpose of this paper to theorize or deal in historical data but rather to present some of the clinical aspects of analysis under narcosis as we have experienced them at Tucker Hospital.

Experiments reported by Erich Lindemann have helped us in our choice of drug. Lindemann in 1930 made some interesting observations on normal individuals who had received small doses of sodium amytal intravenously (3—4½ grains). His conclusions were:

"The psychological changes in normal individuals were characterized by a feeling of serenity and well-being, a desire to communicate and to speak about problems of a personal nature not usually spoken of to strangers. There was, also, the feeling of being unable to guard against saying things which one does not want to and an inability to not answer questions even if they refer to very intimate matters.

"The subject's behavior was friendly, amiable, emotionally warm, sometimes sentimental, combined with a certain distractability and lack of will power or willingness to stick to the subject of conversation. As a whole the picture was that of a mild euphoria with rapid flow of associations but no increase in psychomotor activity."

Sodium amytal has also become our drug of choice because of its rapid action, short duration and mild toxicity. Small dosages produce a fair degree of narcosis without over-clouding consciousness. One of the chief advantages of this method is that specialized skill in hypnosis and analytical technique is not a requisite, but a workable knowledge of psychodynamics and psychopathology is important, especially important during the stage of synthesis or reintegration of a dissociated personality. Narco-analysis provides a simple means for establishing contact with patients. Inaccessible patients usually become accessible. Confidence is readily gained.

Indications for the use of narco-analysis are many. Agitated and depressed individuals who are confused by acute worry have a lessening of tension that enables them to understand and accept the need for treatment. Those whose self expression is blocked by reticence, shame and fear are able to give a more complete account of the factors and experiences of life that have played an important part in the development of their present mental state. Suppressed and repressed emotional conflicts such as are present in obsessive compulsive and reactive depressive states can usually be uncovered. Acute anxiety states develop a calmness that permits the patients to relate shocking experiences without too much emotional excitement.

As a diagnostic aid procedure in borderline cases, the use of narco-analysis has much value. Psychotic trends which the subject is endeavoring to conceal will come to the surface and the degree of fixation of false ideas can be estimated. Powers of reasoning and insight can be investigated more thoroughly and suspicious individuals become freer and more amenable to reason. The method can be used at an early interview or at any time during a psychopathological study to overcome resistances.

The general management varies, but whenever feasible we use the following routine. An investigation of the history, physical and mental status precedes the narco-analysis. During the mental status investigation am-

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nesic gaps and apparently complexed ideas are noted. These are elaborated and specifically probed during the narcosis. The preliminary life story, as related by the patient, may contradict the story as given during narcosis and the true, complete story may not be obtained until a subsequent session is conducted.

It is well to have routine psychological tests made beforehand, too, if such studies are to be included. The suggestions and conclusions made by these tests usually concur with the material obtained during narco-analysis. A preliminary discussion with the patient about the treatment is always desirable, and in acute anxiety states, essential. Confidential rapport is also desirable, but on several occasions I have been called on by another member of the hospital staff to conduct a narco-analysis without any previous contact with the patient.

The subject is placed in a reclining position in a quiet semi-darkened room. The position of the examiner should be such that the patient is unaware that notes are being recorded. This is especially true at the beginning of the interview. Later on, they don't seem to mind. The barbiturate (sodium amytal, 7½ grains) is dissolved in 10 cc. of distilled water. A 10 cc. syringe and a 23 gauge needle are used for the injection. Any convenient vein may be used. One of the superficial cubital veins is the usual site of injection. The drug is given at a rate of 1 c.cm. per minute, or slower. The dosage varies from 3 to 10 grains. The average is 5 to 7½ grains. While the drug is being injected, the subject is told that it will produce a drowsy feeling.

The stage of light narcosis is reached when the patient appears relaxed and at ease. Free association is encouraged at this time or simple questions may be asked. These should be repeated until the answer is clear and complete. Frequently the patient begins to talk spontaneously at this level. If so, the injection is halted, but the needle is left in the vein. Enough pressure should be maintained on the piston to prevent back flow and clotting of blood in the needle. This will facilitate the resumption of further infusion if spontaneity does not continue.

The subject's attention must be actively engaged to ward off sleep. They may yawn or speak with a thick tongue. Such manifestations are transitory. A state resembling hypnosis can be induced by talking to the patient and making suggestions, such as: "You feel restful and pleasant, relaxed and peaceful." "You are completely at ease and can speak freely of all your thoughts and experiences." Questions relating to family, home, school and playmates in early life will usually bring about the desired volubility. The response obtained at this stage is largely dependent on the skill of the interviewer as most patients prefer sleep.

If hypnotic rapport cannot be obtained, this stage of light narcosis may be terminated by suggestions of well-being and the assurance that they will be able to remember later. In such instances the next session should be conducted at an early date. It may be necessary to continue to inject the drug until the patient is barely conscious and resume questioning and suggestions as soon as wakefulness is apparent.

The patient becomes oblivious to the surroundings and will talk freely with little prompting for several hours or as long as it is thought expedient to continue. The average length of time is two hours for one session. The ability to recall forgotten incidents is remarkable. There may be a sudden restoration of a painful memory. The mental suffering attendant to such memories is evidenced by emotional outbursts and motor activities as these experiences are being described and relived. It is important to probe fully into these episodes as patients tend to slur over experiences associated with strong guilt feelings. A second session may be required before all the painful details accompanying these outbursts can be elicited. Trivial details may be recalled that contain much relevant and significant material which will aid in studying the subject's conditioned habit patterns of reaction. Conflicts and psychic traumas come readily to the surface and those that contain a large degree of emotional coloring will be recalled again and again at various levels of the analysis.

Since one of the purposes of narco-analy-

sis is to fill in amnesic gaps, it must be born in mind that amnesia is also, a protective mechanism and that the sudden return to consciousness of intolerable experiences may provoke a frenzy or suicidal attempt. Such reactions are anticipated and suitably adjusted. If this cannot be done, other treatment is instituted. We have quieted such frenzies by giving enough drug to produce sleep for an interval of one to several hours, resuming intensive psychotherapy during the wakening stage. These frenzies may be delayed for several hours. Therefore it is best to have all patients under observation until it is certain that they are safe. Carefully reinforced explanations and persuasions are used during the re-education process. It is important that every analysis be stabilized by such a deliberate synthesis as to give the patient a clear constructive formulation by which an adjustment toward emotional sensations and situations can be made. They should be helped to see and accept reality through the implications from these newly discovered facts and shown how to incorporate them into daily living.

The number of sessions required is determined by the original indication, the material obtained and by the reaction to the session last completed. If the patient is coherent, rational and shows a proper interest in his or her welfare, there is probably no need for further analysis or psychotherapy under narcosis, but if the symptoms or attitudes persist, the session should be repeated, or other treatment instituted. This may be electro-shock, insulin shock, psychotherapy or other treatment.

Electro-shock therapy is more effective in the reactive depressive states if preceded by a thorough aeration of emotional stresses by narco-analysis. Acute anxiety states or frenzies in hysterical situations following narco-analysis may have to be alleviated by electro-shock treatments. In either condition, only a few shocks are necessary. The symptoms may become more intense after the first or second shock treatment, but good results usually occur after the third shock. Active psychotherapy based on material obtained during analysis will aid in recovery.

The choice of treatment in borderline cases is facilitated by narco-analysis. If insulin shock treatment is used, the patient is more amenable to psychotherapy during the shock periods and the catatonic dementia praecox is more cooperative to treatment if narco-analysis is used as a preliminary means for establishing confidence. If psychotherapy is to be the follow-up treatment, the next interview should be conducted early and the subsequent ones frequently enough to maintain the good effects started by narco-synthesis.

The above conclusions have been derived from the results of a series of fifty cases on whom we have made an analysis under narcosis. The following reports are typical situations encountered:

Case No. 1—White, female, age 35, admitted to the hospital on November 4, 1944. Her complaints were many, chief among them being: insomnia, weakness, palpitations, unconscious spells, inability to concentrate, stomach trouble and frequent stools. The preliminary history revealed the fact that she had been employed by the same firm for seventeen years. Her work had been satisfactory and she liked her office associates. Her childhood experiences were average except for frequent concerns about her mother's "nervous spells." These had extended throughout the patient's entire existence. There were a few love affairs—a rather serious one ten years before we saw her—but nothing permanent developed. She did admit that she became very upset at that time. When we saw her she was engaged to a soldier in service overseas. She had had no word from him or about him for two months.

The physical examination was negative except for moderate anemia and high blood cholesterol. Her somatic complaints began during 1930. She consulted many physicians, the varying diagnoses being "gall bladder trouble, spastic colon and a case of nerves." In 1934 she had an exploratory abdominal operation. The appendix was removed. Symptoms were not relieved. Faints and weak spells began in 1941. She continued going to doctors. She was emotionally disturbed when we saw her but she would not elaborate any of her experiences

and had a fixed idea that her symptoms were organic in origin.

The Rorschach summary was as follows: "The record indicates that the worst type of hysterical behavior can be anticipated in this case. There is little adequate control over emotional reactions to the outside and control over reactions to the inner promptings is weak and ineffective. The marked anxieties and unsuccessful attempts at control over emotional responsiveness is causing a mounting tension within the subject."

On November 16, 1944, we did a narco-analysis. This session was directed toward her developmental history, particularly relationships with her mother. We learned, contrary to former statements, that there had been an unhappy childhood, fraught with many misgivings about her mother's ill health, numerous jealousies and dissatisfaction with her own appearance. When she relived these contacts, she became very excited and vengeful. Some of her statements were: " 'Everytime I tell my mother what I feel like she always says she had a much harder time than I.' 'Instead of my mother raising me, I've had to raise her. She drives me frantic.' 'I was in a constant state of conflict trying to live like other people away from home and trying to please my mother at home. She is prudish and can't help it.' " She became so excited that I thought it best to terminate the interview. She was given enough sodium amytal to keep her asleep until the next morning. The following evening narco-analysis was resumed. This time we directed the interview toward her sexual development. She had a normal education in sex; had undergone no significant traumatic experiences, felt no sex drives until she 'fell in love' at about 25 years of age with a man who worked in the same office. She lost all sense of poise and threw herself at him. She tried, with all her female instincts to interest him, but never allowed sexual intercourse. When he married another girl she became very upset. She related a long story of humiliation and frustrations. Following this session she improved considerably, but continued to complain of an intense feeling of emptiness in her lower abdomen and periods of panic.

About a week later we did a third narco-analysis. This time she was directed to speak about her work and office personnel. Then, we learned that her immediate superior had taken her with him in a business capacity on numerous trips over a period of years. He had tantalized and humiliated her with amorous advances during this time. She was in a state of continual conflict because of her sexual desires and lack of complete expression. The fiance overseas was, apparently, giving her little concern. She supplied her own engagement ring and was humiliated by the fact that she knew nothing about his family or how to obtain information concerning him or his whereabouts. She expressed the usual anxieties about her chances for marriage. Subsequent psychotherapeutic sessions were conducted under narcosis in an attempt to implant some insight, understanding and reassurance. This was undoubtedly a condition where anxiety had been dissociated from the total personality and was being expressed in somatic symptoms of a hysterical type. There was, also, a large element of competition and identification with her mother. As her defensive mechanisms were being reduced, she became more depressed, anxious and agitated. Her somatic complains were almost gone and she demanded that we do something about her miserable emotional state. She threatened to commit suicide if we couldn't do something soon. We gave her some electro-shocks. After the first and second shock her symptoms appeared even more intense, but after the third, fourth and fifth shock she became calm and was able to accept constructive psychotherapy. She finally developed an agreeable personality and was discharged early in January 1945.

Case No. 2—White, female, age 29 years. Seen in the office on June 21, 1944. Her complaint was inability to control her urinary sphincter. On occasions catherizations had been required to provide relief. She had been under the care of a urologist who could find no organic basis for her difficulty. He referred her to the Tucker Hospital staff for diagnosis and treatment on a functional basis. She was seen in the office. The suggestive implications that she received from

these interviews threw her into a state of resentment and panic. She became resistive to further psychopathological study.

On August 10th I was asked to do a narco-analysis. She didn't like the idea and resisted briefly, but as the sodium amytal took effect she lost her fearfulness and began to talk freely. She was always slow about initiating the elimination of urine. When she was five years old her grandmother noted her hesitancy and suggested that she probably had kidney trouble. She related many childhood episodes that caused her to be ridiculed about her slowness. Some of them were sources of marked embarrassment to her. She brooded over these and decided that she was different and probably sick. She grew up to be a tall, gangly girl in early adolescence and felt that boys did not like her. She was an only child. Her mother was socially ambitions. She was not pressed or questioned if she complained about her bladder trouble. She lived fairly comfortably until 21 when her father developed a mental illness that caused the family great concern. Two years before we saw her, her father was committed to a state hospital where he died one week later. She apparently had much guilt concerning her father's disposition and begged to be reassured about the correctness of it. At the time we saw her she had the added anxiety of her mother's heart disease and the dread of being left alone in this world. The patient became frenzied at this stage. I gave her enough sodium amytal to quiet her. After a couple of hours, I aroused her and began a synthesis of her conditioning toward emotional strains. She was seen in the office soon, and frequently thereafter over a period of several weeks. During these sessions she was reassured, re-educated and aided in adjusting to the realities of her present world. Her symptoms slowly disappeared and she is now able to function as well as before her father's illness.

Case No. 3—White, female, age 26; seen in the office October 16, 1944. Her complaints were a ritual type of obsessive-compulsive neurosis, fear of pointed objects and insanity. She talked freely and with marked emotional expression. Her mother died when she was very young. The patient and her two brothers were placed in foster homes. She was lonely and unhappy, feeling that she was not wanted. Later the father remarried and the patient was taken away from her foster home to live with her stepmother who did not accept her as an own child. So in addition to the insecure feelings she already had, she developed a resentment towards and jealousy of her stepmother. In high school she was unable to adjust socially. After she finished high school she went to work. She moved out of her home, sharing an apartment with two girls. During this time she met a medical student who showed her some attention. She attended fraternity dances and was happier than she had ever been before. This young man induced her to submit to sexual intercourse. She hoped he would marry her. Instead, he married someone else as soon as he completed his internship. Following this, she became very unhappy, resorted to frequent masturbation and felt that she was burdened with guilt. This affair had terminated two years before her compulsions began. Her present symptoms had developed about one month before she came to our office. We tried using constructive psychotherapy on her with little result. Believing that she had not told us the entire story in spite of her willingness to speak about herself, a narco-analysis was done on December 15, 1944. This analysis was directed into the interval between the loss of her boy friend and the development of her obsessive ritual. We learned that she had continued her sexual indiscretions with many men. She stated that none of these contacts gave her any sexual satisfaction and complained of being unable to resist any man who desired her. She begged for an explanation of her conduct and an estimation of her future security as to marriage and a home of her own. She was given some explanations and reassurances while under narcosis. The next day she was seen in the office again, and an intensive psychotherapeutic plan was formulated. She lost her compulsive drives very quickly and is at the present time trying to decrease her vulnerability to men.

A Study of 50 Veterans of World War II Admitted to the Philadelphia General Hospital Psyciatric Building

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Mental illnesses constitute one of the most vital medical problems in the armed forces today. Tomorrow the sequel will be seen in the civilian hospitals. Even at this early date, recurrences of mental disorders are becoming manifest in the institutions of the country. The purpose of this paper is to report a study of 50 veterans who have been admitted to Philadelphia General Hospital Psychiatric Building between January 1944 and October 1944. It is believed that these cases are typical of what may be expected in the years to come. To accomplish this end, the paper will attempt to answer three questions:

1. Do the veteran psychiatric disorders differ from civilian psychiatric disorders?
2. Was the service primarily responsible for the original breakdown, or was it only a precipitating factor?
3. Was the government negligent in—
   a) Inducting these men?
   b) Releasing these men before they had proper treatment?

1. Do the Veteran Psychiatric Disorders Differ From Civilian Psychiatric Disorders?

DATA:

A. DIFFERENT DIAGNOSES

Schizophrenics—46% divided as follows: simple 34%, paranoid 6%, catatonic 4%, hebephrenic 2%.
Manic Depressive, manic phase 12%
C.P.I. 14%
Miscellaneous—28% divided in these categories: psychoneurotic 12%; mental defective 4%; alcoholic 2%; possible organic lesion 4%; unclassified 6%.

B. RELIGION

Catholic 44%; Protestant 36%; Hebrew 6%; Unknown or None 14%.

C. RACE

Negro 8%; White 92%.

D. BRANCH OF SERVICE

Army 66%; Navy 20%; Coast Guard 4%; Marine Corps 4%; Merchant Marine 4%; Army and Navy 2%.

DISCUSSION:

It must be stressed that the great majority of these cases were discharged because of mental disorders, or their actions which may be directly attributed to their instability. As examples of the latter:

One veteran was shot in the back while attempting to escape from the guard house. In broad daylight, he made a wild, hopeless dash for freedom.

A young orderly was given a dishonorable discharge after stealing his commanding officer's ring. The theft was so obvious that it was inevitable that he be caught. It is interesting to note that he was admitted to Philadelphia General Hospital because of theft of an automobile.

With the exception of four cases (1 British seaman, 1 Swedish seaman, and a Coast Guardsman sent to Philadelphia General Hospital directly from their ships and a schizophrenic discharged from the Army because of age) all of this group had shown signs of mental illness while they were in the service, before their admittance to Philadelphia General Hospital. As these cases may be regarded as recurrences, to the point where they require hospitalization, it is easier to understand why the number of psychotics is so high compared with the number of psychoneurotics.

This series of cases manifested no peculiar qualities that would distinquish them from civilian patients. The impression formed while interviewing these men is, that were these normal times, many of them would have been sent to prison instead of a mental institution. The authorities seem more sym-

pathetic on learning that the individual has been discharged because of "nervousness." This impression is confirmed by the police records of some of these men before they went into the service.

2. Was the Service Primarily Responsible for the Original Breakdown While in the Service, Or Was It Only a Precipitating Factor?

DATA:

A. LENGTH OF SERVICE

Under six months 23%; 6 months to 1 year 32%; Over 1 year 26%; Unknown 18%.

B. ACTION

Seen action 14%; No action 86%.

C. NUMBER WHO HAVE RECEIVED PSYCHIATRIC TREATMENT BEFORE SERVICE

Treatment 18%; No history of treatment 82%.

D. HISTORY OF PARENTAL INSANITY OR CHRONIC ALCOHOLISM

Father 10%; Mother 14%; Both Parents 10%; No History 66%.

E. DOMINANT PARENT

Mother 32%; Father 2%.

F. ADJUSTMENT BEFORE THE WAR

Poor adjustment 50%; Passable adjustment 20%; Questionable 30%.

G. EDUCATION

Less than 8th grade 32%; 8th to the 12th 30%; High School graduates 12%; Training after high school 18%; Unknown 8%.

DISCUSSION:

The majority of persons discharged from the armed forces for psychiatric reasons are psychoneurotics; a smaller number are discharged as psychotics. The comparatively small percentage of psychoneurosis in this series of recurrences indicates that the service is probably responsible for breakdowns in many cases. There are many people who in civilian life are borderline and under normal average conditions can carry on a useful life in society. However, these people are unable to stand the strain of or make the adjustment to military life and as a result they break down. This series would indicate that the great majority of these cases are able once again to continue a fairly normal existence when they return to civilian life.

On the other hand, the cases in which there are higher degrees of inadaptability in civilian life, as is the situation with most of the psychotics, it can readily be seen why they have difficulty also when they return to civilian ways. Many of these veterans were unable to get along in society before they entered the army and as might be expected were unable to adapt themselves in the Army and also when they again returned to their original walks of life. It takes longer than a year or two to develop the ground work for psychosis but the psychosis may be precipitated in a short time.

3. Was the Government Negligent in:

a) Inducting these men—

Upon superficial examination of the data it might appear that the government has done an inadequate job in selecting these men. However, on careful scrutiny, this impression will be dispelled. For example, of the nine men who had received psychiatric treatment, four manics and one catatonic schizophrenia lied their way through the psychiatric interview when they were inducted. As these interviews are brief it can be readily understood how this came about. A more thorough screening examination would probably uncover more potential cases, but as Sheps et al[1], have shown in their study of successful soldiers, many of them have mental symptoms. These authors even suggested lowering the standards. Men with poor backgrounds do not necessarily make poor soldiers.

In this series, there were only 3 men or 6% with whom the examiners seemed to show poor judgment:

(1) One schizophrenic who was inducted in spite of having been in a mental institution, because the draft board had to fill its quota.

(2) One patient who was inducted into the Army after he had been discharged from the Navy because of "nervousness."

(3) An 18 year old Italian boy who was inducted in spite of his inability to read or write after extensive training, but could speak three languages fluently.

b) Was the government negligent in releasing these men before they had proper therapy—

DATA:

Time between discharge and admittance: Immediately 8%; Under 3 months 16%; 4 to 6 months 12%; 7 months to 1 year 15%; Over one year 18%; Unknown 16%.

DISCUSSION:

The data indicate that either the government discharged these men before they had sufficient treatment, or they should not have been released at all. Recurrences of psychotic manifestations is the rule rather than the exception. However, when there is a 66% recurrence within one year's time, there must be something wrong. There are two factors which can explain this high percentage in part.

First is the policy of releasing some patients for "home treatment". This is an example: A 20 year old soldier had a breakdown several months after induction. He became depressed and was diagnosed as a manic depressive in the depressed state. The Army sent him home to his family with a note saying that all he needed was a month or two of home environment and good food, etc. Unfortunately, this was not the case. One month after he was discharged, he went into the manic phase to the point where he became unmanageable.

A second factor is that many patients in Army mental hospitals are in depressed states and convey their feelings to their well meaning parents. The latter then proceed to have their boy released "against advice".

Steps should be taken to overcome these errors. In the first case, it is a poor policy to believe that home treatment can cure a manic depressive in the depressed stage. This is inexcusable and shows gross negligence. The second problem is not easy of solution for the same situation is faced in civilian hospitals. Perhaps, a personal letter from the medical officer in charge to the parents explaining the situation, or an interview with an informed social worker would be helpful.

On the other hand, it may be that these cases are the exceptions; it may be that these men are the few that slip by. At any rate, nothing is being done after they are discharged to prevent the recurrence. Many large cities have clinics for the returned veterans. These men need psychiatric treatment badly. Under proper clinical guidance, many might be helped before it is too late.

SUMMARY:

1. There were no unique diagnoses or traits which would distinguish the veteran group from a civilian group of mental patients.

2. The Army was not primarily responsible for the breakdowns, but rather the precipitating factor.

3. In only 6% of the cases could the government be called negligent in induction of the men.

4. This group of veterans has not received sufficient treatment either while they were in the Army or after they were discharged.

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Neurological Clinical Pathological Conference

of the

Cincinnati General Hospital

CHARLES D. ARING, M.D., Editor

CASE NO. 5610

Presentation

A 45 year old, colored woman was repeatedly admitted to the Cincinnati General Hospital because of apoplectic episodes. Hypertension (160/90) was found incidently at the age of 33 when she underwent dilatation and curettage at this hospital because of menorrhagia of 18 days duration, bearing down pains, and nausea and vomiting. She had been closely followed in our Out Patient Clinic for four years before death.

In late 1940 she had fallen on the street and had been brought to this hospital by the police, but she was able to walk shortly thereafter. Early in 1941 she was complaining of epigastric pain, nausea, vomiting, headache, and bloody expectoration. One morning on attempting to arise from bed she fell to the floor because her left lower extremity would not support her. She remained in bed until she was brought to this hospital on January 17, 1941, lethargic and incontinent of urine. Examination revealed venous compression and engorgement in the retinas. The neck was rigid. The left extremities and face were slightly to moderately weak. The plantar responses were extensor, and all the deep reflexes hyperactive. The heart was moderately enlarged to the left and there was a systolic murmur at the apex. The blood pressure was 235/140. She improved gradually and was discharged on February 17, 1941, but she never regained health.

In September 1942 the blood pressure was 216/144. In December 1942 she had an attack of vomiting which lasted for 5 days, she suffered vertigo and fell on one occasion. In March 1943 she complained of weakness in the right limbs and the deep reflexes were more active on that side. The appreciation of touch and pain was diminished in the right extremities and right side of the face. She was having frequent occipital headaches, and her husband noted her failing memory and frequency of urination.

(Her husband, aged 48, developed a left hemiparesis on May 3, 1943. His blood pressure was 150/110 and his weight 225 pounds. With gradual reduction of weight to 180 pounds, hypertension has remitted.)

In August 1943 the patient's blood pressure was 250/150. The retinal arteries were as narrow as possible, and scars were seen in the left retina and in the left macula. Right hemiparesis remained and was accompanied by extensor responses on this side. She was incontinent of urine. On October 5, 1943 a cystometrogram revealed the bladder to be of the spastic reflex type with loss of sensation and inhibition.

On the morning of June 21, 1944 she was aroused with difficulty. She vomited many times during that day. She remained lethargic. The right extremities became weaker and she was readmitted to the hospital on June 22. The blood pressure was 250/150. When she aroused she had rightsided signs as before, but no dysphasia.

On July 13 she complained of more headache than usual and again began to vomit. There now was papilledema and hemorrhage as well as scars in the retinas. The neck was stiff. The motion in the right extremities was feeble. The plantar responses on the right were extensor in type. The patient was confused.

During the next two months she remained delirious and was usually extremely drowsy. The face became masked, she rarely blinked, the eyes moved spontaneously from side to side in unsteady, jerking motion. She tended to be mute, but would answer "yes" or "no" when prodded.

On September 15 she had a generalized convulsion, which was followed by intermittent muscular twitching for about two

hours; then she had a clonic convulsion of the left extremities, the head and eyes deviating to the left.

She developed large decubital ulcers. On October 24 she had another convulsion which began with several minutes of clonic jerking of the left upper extremity and then spread to the left lower. Finally the attack became generalized, and then repetitious; paraldehyde intravenously was given to halt them.

The temperature and pulse rate gradually rose during the last three weeks of life. She could barely swallow on November 2, and on November 3 she could not be aroused. She died on November 7, 1944.

Laboratory Data: The cerebrospinal fluid findings were as follows:

Date	Pressure	Color	RBC	WBC	Protein mg.%
1/18/41	340	Pink amber	15,300	62	99
1/19/41	340	Pink amber	15,000		
1/21/41	300	Xanthochromia	5,400	57	200
2/ 7/41	250	Xanthochromia	86	6	50
10/ 8/42	150	Water	100	3	95
6/22/44	200	Pink	30,000	30	175
7/14/44	420	Pink	10,000	10	
10/20/44	115	Water	4	0	60

The bloody cerebrospinal fluids were xanthochromic on centrifuging. Occasional colloidal gold curves and cerebrospinal fluid Wassermann tests were negative.

Blood Wassermann was positive in May 1933; the blood Kahn was negative on June 23, 1944.

Blood urea nitrogen was determined as follows: January 18, 1941—10 mg.%; November 16, 1943—8 mg.%; June 22, 1944—19 mg.%; June 23, 1944—17 mg.%; July 15, 1944—21 mg.%; July 18, 1944—14 mg.%; September 6, 1944—10 mg.%; October 20, 1944—9 mg.%. CO_2 combining power was 55 vol.% on July 15, 1944.

Urinalyses on November 16, 1943 revealed 1 plus albumin. Later the urine was normal, until early September 1944 when specimens obtained by catheterization contained much albumin and many red blood cells. Thereafter the urine was usually normal; the highest concentration in the routine specimens was 1.020, the lowest 1.006.

The hemoglobin was 13 grams from July to October 1944, thereafter ranging around 10 grams. Red blood counts ranged around 4.5 million; white blood counts were normal until September 1944, and ranged between 13,000 and 15,000 thereafter.

In June 1944 the electrocardiogram was interpreted as showing evidence of myocardial damage, probably due to coronary disease. On January 25, 1944 roentgen studies of the skull were normal.

Differential Diagnosis

Dr. Eugene B. Ferris, Jr.: The case today seems to be one of hypertension in which central nervous system symptoms are outstanding. The nature of these manifestations and the duration of the neurological disease in association with marked hypertension suggest that we are dealing with advanced cerebrovascular disease.

Over the last four to five years of life, the patient experienced a number of cerebral disorders, which, when considered together, may help in better understanding the nature of her disease. Late in 1940 she had a transient attack of weakness; and in early 1941 she developed nausea, vomiting, headache, and hemoptysis, followed after some interval by a left hemiparesis. The signs at this time, besides the hemiparesis, were stupor, marked elevation of blood pressure, evidence of cerebral edema, and mild bleeding into the subarachnoid space. I base the diagnosis of the cerebral edema on the engorgement of the retinal veins and the height of the cerebrospinal fluid pressure (340 mm. of water) which seems out of proportion to the amount of bleeding (15,000 RBC). There is no doubt that the patient had a hemorrhage involving the right hemi-

sphere at that time. Something was happening before this hemorrhage occurred, however, as was evidenced by the nausea, vomiting, headache, and hemoptysis. These cerebral symptoms indicate increased intracranial pressure, and the hemoptysis suggests that a marked elevation in blood pressure occurred at this time.

It is interesting that subsequent to this attack, the patient's blood pressure was sustained at high levels. In December 1942, an episode of vomiting occurred which again suggests increased intracranial pressure with cerebral edema rather than a sizeable hemorrhage, since localizing signs were lacking. In March 1943, she developed right hemiparesis, diminished mental acuity, and recurring headaches. No doubt the patient had a hemorrhage into the left hemisphere at that time, and the repeated headaches indicate that the disease in this patient was by no means quiescent.

In August, the retinal arteries were extremely spastic and there was evidence of previous retinitis. There was no edema of the retina or disc or other manifestation of increased intracranial pressure. She had a spastic reflex bladder, which I understand may occur when the descending tracts from both hemispheres become involved, as they were in this case at that time.

In June 1944, she had another acute cerebral episode with vomiting, lethargy, and further weakness of the right side. Again there was mild subarachnoid bleeding, probably secondary to intracerebral bleeding. In July, there was another attack of headache and vomiting with papilledema; and there was fresh retinal hemorrhage and a cerebrospinal fluid pressure of 420 mm. of water with few red blood cells in the fluid. Here again we must attribute most of the increased intracranial pressure to edema rather than to hemorrhage.

For four months before death she continued to show evidence of diffuse cerebral depression, namely stupor and delirium. In addition she had signs of cortical involvement in the right middle frontal gyrus as indicated by the convulsion involving the left extremities, with deviation of the head and eyes to the left. The masked face and the terminal dysphagia probably indicate suupranuclear palsy.

There is little else to be considered in this case other than hypertensive vascular disease of the brain, considering the duration and diffuseness of the process and the tendency for the manifestations to exacerbate and to remit. The central nervous system manifestations were out of proportion to those in other organs, usually affected by such a malignant form of hypertension. Here we see hypertension of a relatively benign form blossom into a relatively malignant form with marked vasospasm.

The diagnosis of malignant hypertension is usually made on the basis of extreme hypertension, depression of the renal function, and vasospasm of retinal arteries with or without papilledema. In these cases the cerebral symptoms are usually related to cerebral vasospasm with resulting cerebral edema and high intracranial pressure, and there is no subarachnoid bleeding or localizings signs. This syndrome is often referred to as hypertensive encephalopathy or pseudouremia and may be seen in malignant hypertension and in acute glomerulonephritis. It is also seen in acute hypertension associated with lead poisoning and in paroxysmal hypertension of adrenomedullary tumors.

In the benign forms of hypertension we expect an entirely different kind of cerebral involvement. Here the patient lives much longer and has benign arteriosclerosis and generalized atherosclerosis; it is in this group that we see localized cerebral softening or hemorrhage without diffuse spasm of the arterioles and diffuse edema of the brain —as indicated by neuroretinopathy and increased intracranial pressure.

The patient under discussion, as the majority of patients with hypertension, lies somewhere in between these two extremes; clinically and pathologically they show evidences of both benign and malignant disease in different vessels. It should be pointed out that benign and malignant hypertension are descriptive terms used to express intensity of the process rather than to indicate fundamentally differing diseases.

The patient had many episodes of cere-

bral vasospasm with edema and increased intracranial pressure and also had repeated intracerebral hemorrhages involving widespread foci. Despite the sustained height of the blood pressure and the evidence of cerebral vasospasm, she never developed congestive heart failure or renal insufficiency, as we would have expected with the more severe grades of malignant hypertension which show extensive necrotizing arteriolitis through the body, especially in the kidneys. Possibly the fact that she was more or less bedridden through the malignant phase of her disease may have something to do with the absence of renal and heart failure. However, it is not unusual in hypertension to see more marked involvement of one organ than of others.

There is evidence that blood vessels of the heart and kidneys are involved to some extent, even though the lesions were not extensive enough to produce heart and kidney failure. The patient not only had an enlarged heart but also had electrocardiographic evidence of coronary artery involvement. Sporadically the urine showed albumin and red cells suggesting involvement of the renal vessels. There is, therefore, sufficient evidence to indicate that this patient will demonstrate the arteriolar lesions of malignant hypertension in the heart and kidneys, albeit the most striking changes will be found in the brain. She will have widespread areas of softening throughout the brain with stages of arteriolitis varying from hyalinization and thickening to necrosis, and will, no doubt, show diffusely scattered ball hemorrhages and venous lesions, the significance of which I leave to Doctor Scheinker.

As to the etiology of the hypertension in this case, there is little to help us in the protocol. In a woman of this age we would suspect pyelonephritis because of its frequent occurrence in pregnancy, but there is no information along this line. Were we dealing with pyelonephritis or glomerulonephritis, I would expect more evidence of renal insufficiency than we have in this case. Not only was the blood urea normal throughout, but the urinary specific gravity varied from 1.006 to 1.020. By negative inference I am left with the diagnosis of malignant phase of essential hypertension, and am bolstered in this by the relative frequency of this disease in negroes of this age.

Discussion of Pathology

Dr. I. Mark Scheinker: There was permission for the examination of the brain only. The leptomeninges were thickened and generalized flattening of the gyri and narrowing of the sulci were observed.

Coronal sections through the hemispheres disclosed scattered areas of old softening; one extensive area of gliosis was to be seen in the head of the right caudate nucleus extending along the lateral wall of the right lateral ventricle. There was a large area of old massive hemorrhage involving the gray and white matter of the left occipital lobe, communicating with the lateral ventricle. The destroyed tissue was replaced by an irregularly shaped, golden-yellow, grumous hemorrhagic mass. Ball hemorrhages were found in the white matter of the cerebellum, in the right uncus, and in the left frontal lobe posteriorly.

Microscopically the subarachnoid space was slightly distended and harbored a small number of gitter cells and red blood cells; in some areas there was dense focal infiltration of the leptomeninges with gitter cells secondary to small softenings, localized in the upper layers of cortical ribbon.

Vascular alterations were predominant in the smaller arterioles and veins. The former exhibited the changes typical of hypertensive arteriolopathy—a conspicuous thickening and hyalinization of the entire arteriolar wall associated with perivascular fibrosis. This hyperplasia of the arteriole led to considerable narrowing of the vessel lumen, which occasionally was reduced to a mere split or completely obliterated.

Changes of the nervous tissue secondary to these arteriolar alterations consisted of circumscribed focal areas of softening containing large numbers of fat granule cells; in addition there were numerous areas of old softening marked by glial scar formation. These focal lesions which undoubtedly resulted from insufficient blood supply, were disseminated throughout the cortical ribbon

and the subcortical white matter. Occasionally they could be found in the pons and cerebellum.

Striking alterations consisting of conspicuous atrophy were seen in the small veins. Medium sized veins consisted of only a thin membrane containing a few lining endothelial cells. The structure of muscularis or adventitia could not be delineated. Cross sections of some of the veins revealed in addition to the atrophic change of the wall, tremendous distention and engorgement with blood. Stasis had occurred, and increased permeation of the vessel wall by red blood cells. The latter were often found in large accumulations in the perivascular spaces. Occasionally veins in an extremely advanced stage of congestion had undergone partial or complete necrosis of the vessel wall and were surrounded by large extravasations of red blood cells, forming ball hemorrhages. In areas of massive hemorrhage (left occipital lobe) the central portion showed complete destruction of nervous tissues. At the periphery there were a few extremely congested veins about which ball hemorrhage had formed.

In addition to these two types of recent hemorrhage (ball and massive hemorrhage) there were numerous circumscribed areas of old or healed hemorrhage. They were characterized by accumulation of amorphous blood pigment enclosed in gitter cells or freely distributed in the nervous tissue, with a dense area of gliosis in and about them.

In sections taken from the central portions of the white matter, the tissue showed the characteristic spongy, sieve-like appearance of edema. Amoeboid degeneration and clasmatodendrosis of the glia and congestion of the veins and capillaries were also found here.

The pathology of hypertensive brain disease is best approached as the finale of a long chain of events having its origin in functional vascular disturbances which are probably reversible in the early stage of the disease. The repeated occurrence of the circulatory disturbance somehow results finally in structural vascular alterations in arterioles and veins, such as have been demonstrated in this case. The widespread areas of softening of nervous parenchyma are secondary to the vascular lesion.

Massive intracerebral hemorrhage is a terminal phase in the chain of events; even this final phase should not be regarded as static. The old idea that ruptured intracerebral aneurysm was the cause of massive intracerebral hemorrhage should be discarded, and more attention paid to the pathophysiology of venous circulation.

Clinical Diagnosis

Hypertensive brain and cardiovascular disease.

Doctor Ferris' Diagnosis

Hypertensive brain and cardiovascular disease.

Anatomical Diagnosis (Brain only)

Hypertensive brain disease.

Dr. Charles D. Aring: It should be pointed out that the multiple softenings which were seen in this brain were unassociated with thrombosis. Thrombosis of vessels in hypertensive brain disease is extremely rare. You will recall that we teach that intracerebral hemorrhage is venous in origin. On the other hand, extracerebral hemorrhage, i.e. spontaneous subarachnoid hemorrhage, is due to rupture of an aneurysm at the base.

The treatment of encapsulated cerebral hemorrhage as far as I am concerned is surgical. Intracerebral hemorrhage has to be removed surgically or else the patient is doomed to relatively early death. This patient survived massive hemorrhage for three or four months, a relatively long survival for intracerebral hemorrhage. Evacuation of contained intracerebral hemorrhage may result in recovery for years.

Doctor Ferris, I believe it is your impression that the blood pressure may be raised by a rather sudden increase in intracranial pressure. The patient presented today is not a case in point, but I think of a woman of about 60 years of age, whose systolic blood pressure was 170 to 200 over a period of ten to fifteen years. Immediately after a stroke her systolic blood pressure could not be recorded since the manometer did not register high enough, and the diastolic pressure was 180. We followed her through the period of shock when the cerebrospinal

fluid was xanthochromic; about seven to ten days after the stroke the blood pressure was 135/85.

Doctor Ferris: The relation between cerebral disturbances and accentuation of blood pressure in hypertension is not clear. It is generally thought that cerebral disturbances are usually preceded by an accentuation of the hypertension due to progression of the disease in the kidneys. It seems to me that in association with the acute vasospastic changes that go on in the brain, cerebral disease may sometimes be primarily responsible for accentuation of the blood pressure in hypertension.

Even moderate elevation of intracranial pressure by the introduction of saline solution into the cerebrospinal fluid will produce a temporary rise in blood pressure. I think very definitely that increased intracranial pressure will raise the blood pressure and particularly so in the patient who has moderate hypertension, whose vessels will go into spasm more readily than normal.

Dr. George L. Engel: The emphasis placed by Doctor Scheinker on venous hemorrhages and on cerebral vasoparesis has reached the point where I think it is about time we began to look into the physiology of the vein wall. If we consider the various conditions in which these phenomena occur, trauma, toxins (arsphenamine and carbon monoxide), disturbances in cerebral blood flow, etc., they suggest that something has happened to the metabolism of the vein wall. Trauma seems not too difficult to understand since the vein wall is probably damaged mechanically. The various toxic agents, like arsenic and sulfonamides, possibly damage chemical systems concerned in the metabolism of the vein wall. The other factors have in common the possibility of hypoxia which I should think would be possible to investigate in animals.

I think one should first look into the question of metabolic activity of vein wall and find out (1) is the supply of blood to the vein wall from the lumen or vasovasorum? and (2) what happens to the vein wall when it is deprived of its oxygen supply? This might be attacked in a number of ways: One could tie off arterial supply and study the vein or one could study the metabolism of isolated veins. It seems to me this is the type of investigation that is now indicated. We should begin to look for a common denominator in this syndrome, now that we have seen under how many different circumstances it may occur.

Doctor Ferris: I think that is very well taken. It seems to me in cases similar to the one presented today, we begin initially with vasospasm; the disease is primarily initiated by spasm in the artery. In this case the blood flow through a specific vein certainly would be diminished.

I think we do have some evidence concerning the effect of anoxia on walls of large veins. Some time ago Doctors Ryder, Molle, and I worked on pressure-volume relationships in intact veins, and we were doing an experiment in which we put a needle in each direction in the vein to be sure we were measuring true lateral pressure. In recording the pressure the manometer fluid displaced all the blood in the vein, and it went into spasm, so that the local venous pressure rose to about 30 cm. of water. The spasm could be relieved by forcing blood into the vein, and could be re-induced by replacing the blood with saline. I think, although it was not conclusively proved, that the vein went into spasm because blood was taken away from it and anoxia resulted. This may be taken to indicate that the vein wall is nourished by the blood contained within its lumen.

Doctor Aring: Landis* has shown that hypoxia may induce increased permeability of capillary walls first to fluid then to protein.

Student: Is a similar picture seen in the veins of the kidney in hypertension?

Doctor Scheinker: I don't know, not much attention has been paid to the veins in disease.

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* Landis, E. M. Micro-injection studies of capillary permeability. Amer. J. Physiol., 1928, 83: 528-542.

Book Reviews

MEN UNDER STRESS. By Roy R. Grinker and John P. Spiegel. Philadelphia: The Blakiston Company, 1945. Pp. xii-484.

This book constitutes an informative, comprehensive analysis of the authors' observation of hundreds of patients in the Ground Forces and the Air Personnel suffering from acute neuroses resulting from the stress of modern war. Part I, The Men, deals with the significances of background and selection. Part II, The Environment of Combat, deals with both the peculiar types of associations that constitute a combat unit and the motivation for combat. Part III, The Reactions to Combat—Morale, covers the topics of reactions to combat based upon previous emotional disorders, neurotic reactions to combat stress itself, the psychodynamics involved in both, and the problems of therapy and actual therapeutic results. Part IV, The Reactions after Combat, deals with the problems entailed by ideas of returning home and the attitude thereby developed, the syndromes of operational fatigue, the various types of emotionally disordered states that may be encountered in actual experience, and the types of treatment and results. Part V, Civilian Applications, discusses the application of the findings to civilian psychiatry and their general social implications. A total of 65 selected illustrative case histories are cited and a reference bibliography of 63 items and an index are given.

The book is interesting, readable, instructive, and it possesses a significant value to the general medical man as well as to the psychiatrist and related specialists. Furthermore, it will serve well in meeting postwar psychiatric problems and in furthering a better understanding of the individual as such and as a member of a group capable of reacting both immediately and remotely to environmental situations past and present.

MENTAL DISORDERS IN LATER LIFE. Ed. by Oscar J. Kaplan. Stanford University, California: Stanford University Press, 1945. Pp. vii-436.

This book is a symposium by 17 contributors, competent in their fields and capable of presenting their material in an interesting and instructive fashion. The statistical, sociological, medical, psychological, nutritional, and psychiatric aspects of the problems of advancing age are informatively discussed, the gaps in present information and the needs of further research are indicated, and each chapter has a well chosen bibliography.

Each contribution is a separate unit, yet the whole book is so organized that it may be read in part or completely to the reader's satisfaction, and it is a pleasure to recommend it to both the psychiatrist and the general practitioner.

Following is a list of the chapter headings and the authors to permit an adequate appreciation of its contents: Introduction, by Karl M. Bowman; A Statistical Review of Mental Disorders in Later Life, by Horatio M. Pollock; Physiological Aspects of Mental Disorders in Later Life, by Nathan W. Shock; Psychological Aspects of Mental Disorders in Later Life, by Harold E. Jones and Oscar J. Kaplan; Sociological Aspects of Mental Disorders in Later Life, by H. Warren Dunham; Mental Health and Nutrition in Old Age, by Erwin Waxberg; Neuroses of Later Maturity, by Norman Cameron; The Involutional Psychoses, by Eugene Davidoff; The Presenile Dementias, by George A. Jervis; Senile Psychoses and Psychoses with Cerebral Arteriosclerosis, by David Rothschild; The Toxic Delirious Reactions of Old Age, by G. Wilse Robinson, Jr.; Older Mental Patients After Long Hospitalization, by Eugenia Hanfmann; The Aged Subnormal, by Oscar J. Kaplan; Psychosomatic Medicine and the Older Patient, by Bela Mittlemann; Psychotherapy in the Older Individual, by Fred V. Rockwell; Mental Hygiene in Later Maturity, by Nolan D. C. Lewis; Orientation of the Problems, by Edward J. Stieglitz.

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